



November 3, 2014

ROOT CAUSE ANALYSIS REPORT

Downtown Underground Network Event on August 13, 2014



AGENDA

1. Introductions & Overview
2. Root Cause Analysis Review
3. O'Neill Management Consultants Review
4. IPL Action Plan
5. Response to IURC Data Requests
6. Q&A



INTRODUCTIONS

- **Kelly Huntington**
 - President & CEO
- **Joe Bentley**
 - Senior Vice President, Customer Operations
- **Mike Holtsclaw**
 - Director, T&D Engineering
- **Jim Sadtler**
 - Director, Transmission Field Operations
- **Kelly Millhouse**
 - Director, Substations and AC Networks



Root Cause Analysis Review



IPL OPERATORS RESPONDED QUICKLY TO SAFELY RESOLVE EVENT WITHIN 15 MINUTES

Time	Occurrence
1:25p	- Conflicting 911 calls reporting smoke and loud banging noise from underground structure and smoke from manholes at 100 S Meridian Street
1:31p	- 1 st IFD units on scene
1:33p	- IPL Team Leader Field Service on scene
1:40p	- IPL Transmission Operations Control Center operator opens Gardner Lane UG 651 feeder breaker - Event ends

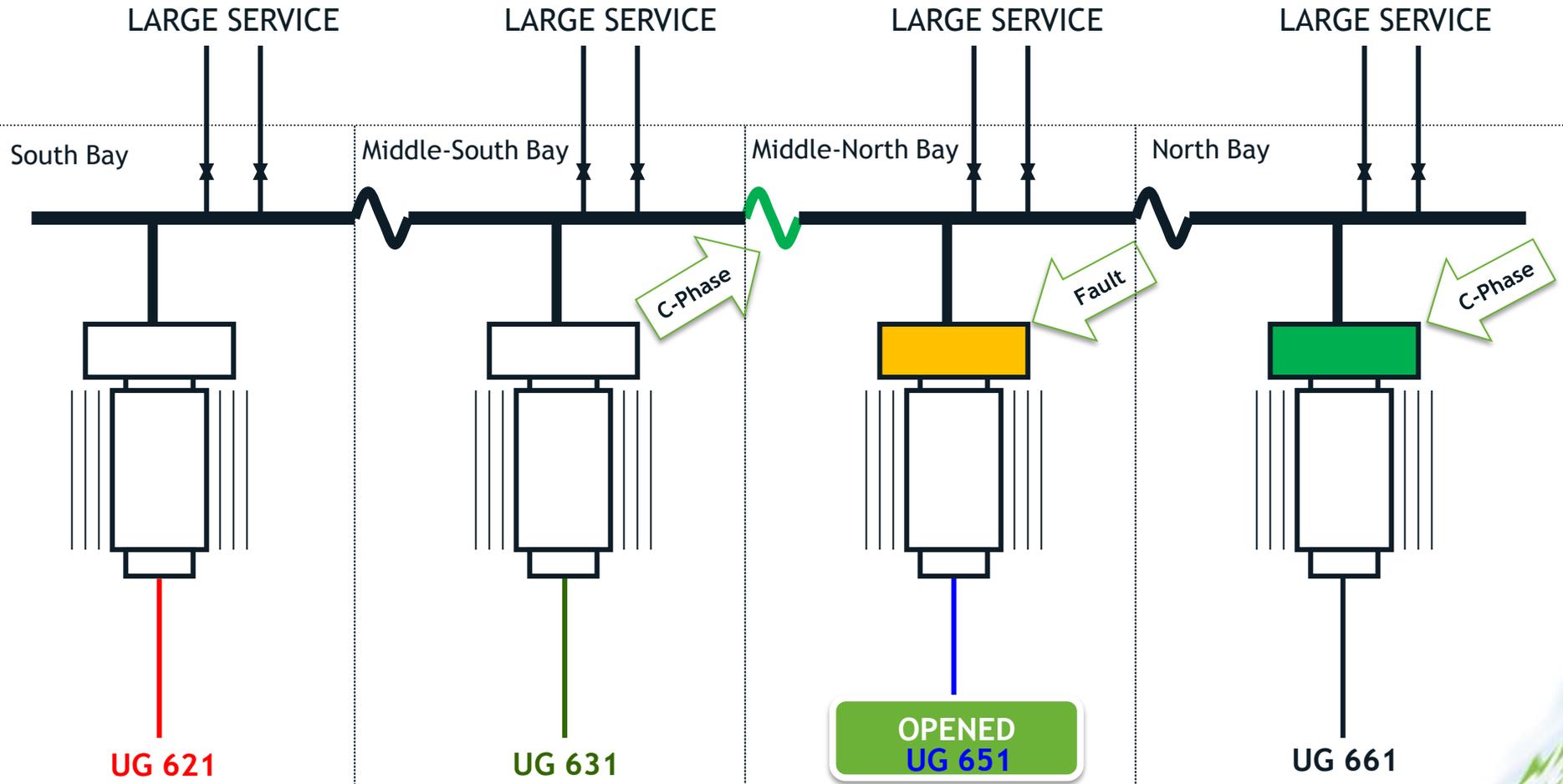


IPL IMMEDIATELY CONDUCTED ITS INVESTIGATION AND INITIATED A ROOT CAUSE ANALYSIS PROCESS

- Evidence preservation began immediately
- Assembled In-house team
- Contacted Eaton Corporation the next day
- Gathered Data
 - YouTube Videos & Security Video
 - IFD information
 - Maintenance & Inspection Records
 - Network Protector Information
 - PI Historian data (Network SCADA & ECS SCADA)
- Analyzed Data
- Developed Conclusions & Action Plans

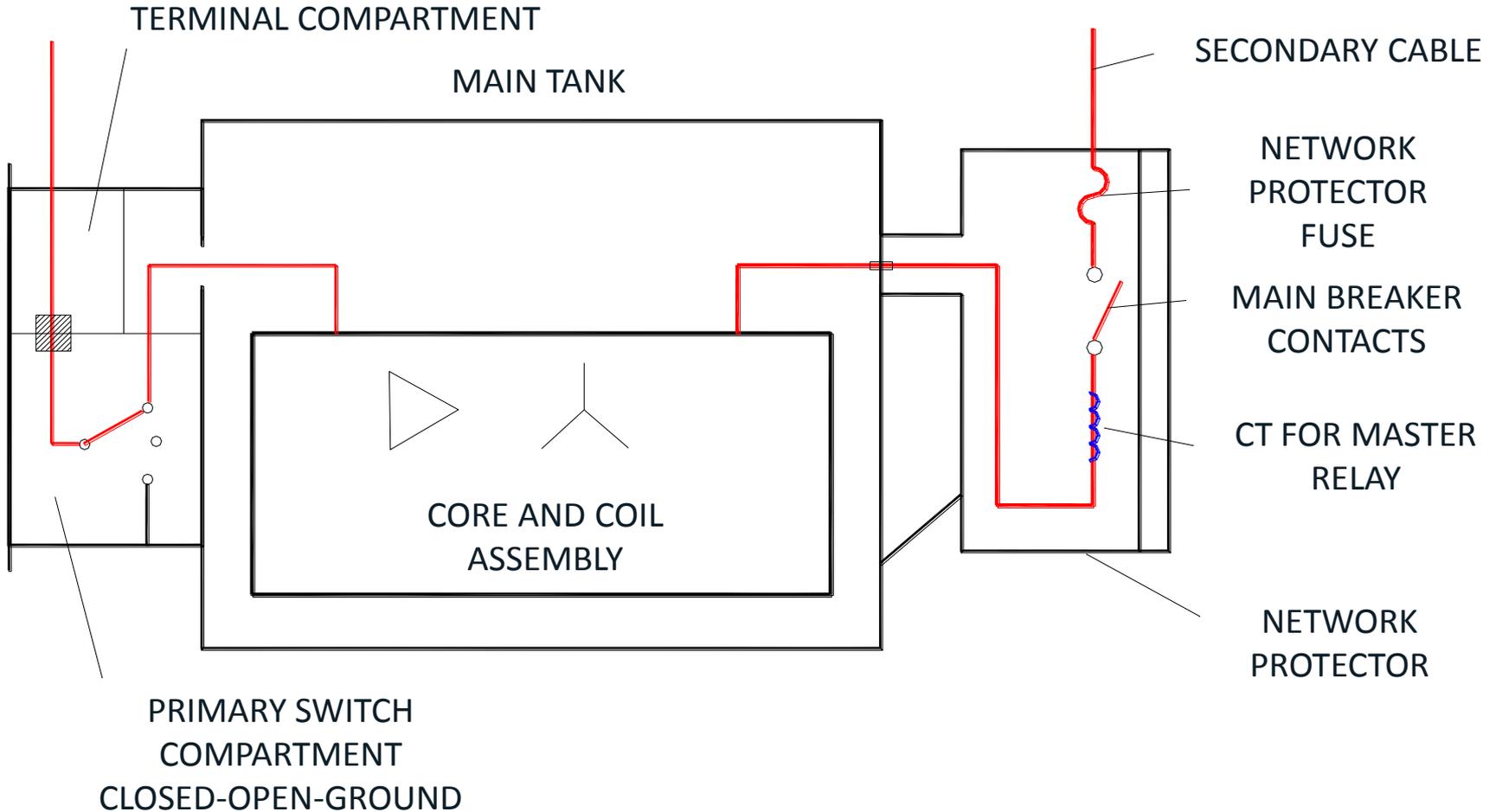


26 S MERIDIAN STREET 480-VOLT SPOT NETWORK VAULT





IPL'S ROOT CAUSE ANALYSIS IDENTIFIED THE TWO POSSIBLE EVENT SCENARIOS





THE EVENT WAS COMPLETELY CONTAINED IN THE NETWORK PROTECTOR

- The Network Protector door remained closed which reduced damage to other vault equipment





O'Neill Management Consultants Review



IPL Action Plan



IPL HAS A THOROUGH PLAN TO OPTIMIZE DOWNTOWN NETWORK OPERATIONS

	Action Plan	Timing
1	Replace all 480-Volt Network Protectors	12/31/2018
2	Document Network Event Response Plan	3/31/2015
3	Meet with Indianapolis Fire Department	9/10/2014
4	Develop Mitigation Strategy	3/31/2015
5	Conduct Review of Gateway Vault Communications	3/31/2015
6	Enhance Network Protector Inspection Process	11/1/2014
7	Update Succession Plans	June 1 st Annually
8	Conduct Staff Training	June 1 st Annually
9	Enhance Audit Maintenance & Inspection Records Process	3/31/2015



IPL ACTION PLAN | #1

- **Replace ALL 480-Volt Network Protectors**
 - Will replace all 480-Volt network protectors
 - 137 protectors in 44 vaults
 - Developed a five year program to replace approximately 30 per year
 - Estimated capital cost of \$15M
- **Verify the location of all 58 pre-1985 Westinghouse CM-22 network protectors - COMPLETE**
- **Re-prioritize the replacement program sequence COMPLETE**



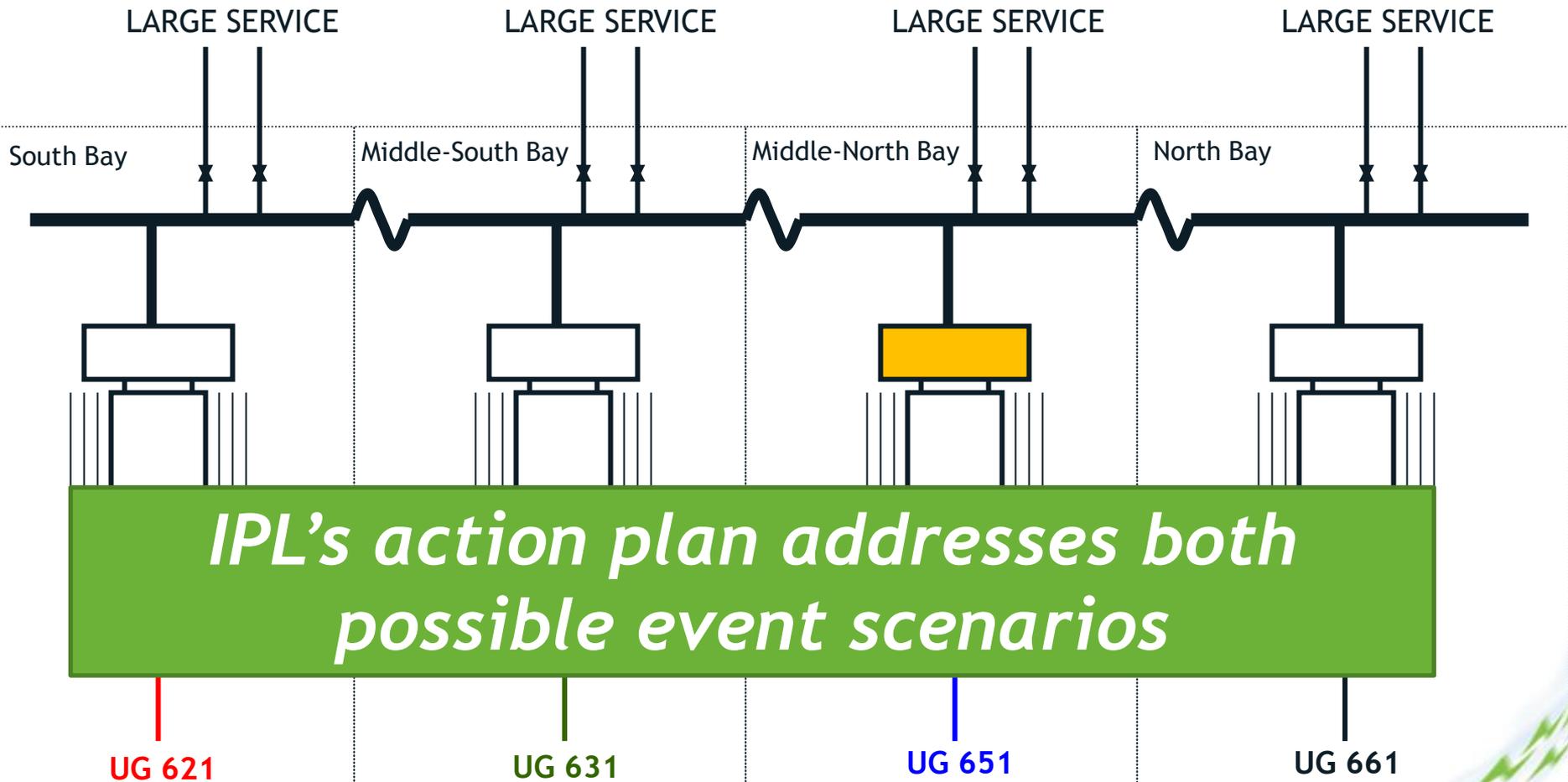
IPL ACTION PLAN | #1 CONT.

- Complete change outs by December 31, 2018
- Timetable allows for minimizing customer outages during the change-out and reduces reliability risks for the downtown network
- Responsible Party: Director, Transmission Field Operations



IPL'S ROOT CAUSE ANALYSIS IDENTIFIED THE TWO POSSIBLE EVENT SCENARIOS

26 S Meridian Street 480-Volt Spot Network Vault





IPL ACTION PLAN | #2

- **Document a formal written Network Event Response and Test Plan including:**
 - Identification of key personnel
 - Event notification
 - Incident command structure for handling network events
 - Identification of on-scene IPL incident commander
 - Annual tabletop drill of the plan
- **Complete Plan by March 31, 2015**
- **Responsible Party: Director, T&D Engineering**



IPL ACTION PLAN | #3

- **Schedule meeting with the Indianapolis Fire Department - COMPLETE**
 - Review the response for a network event
 - Discuss coordination with IPL
 - Discuss lessons learned from August 13th event
 - Meeting was held on 9/10/14 and feedback will be incorporated in Network Event Response Plan (Recommendation #2)
- **Meeting was held on September 10, 2014**
- **Responsible Party: Director, T&D Engineering**



IPL ACTION PLAN | #4

- **Develop a mitigation strategy that limits severity and consequences of a network transformer or network protector failure**
 - Better information at the substation level
- **Complete Action Plan, including identification of major milestones for selected strategy by March 31, 2015**
- **Responsible Party: Director, Asset Management**



IPL ACTION PLAN | #5

- **Conduct a review of all Gateway Vault circuits for communications stability and frequency of telemetry errors**
 - Determine frequency of communication errors
 - Review response process for Network SCADA communication errors and who is notified
 - Review the routing of Blue Network SCADA communications cable in the vaults. Determine if there is a way to provide increased fire protection during an event.
- **Complete Review and Develop Action Plan, including major milestones by March 31, 2015**
- **Responsible Party: Director, Transmission Field Operations**



IPL ACTION PLAN | #6

- Enhance the network protector inspection process
 - Add visual inspection of the bottom area around the transformer bus in the network protector for debris or evidence of tracking on the bus support insulators - Added to tablet electronic inspection form
 - Add visual inspection of the network protector bushing for signs of cracks or tracking - Added to tablet electronic inspection form



- Complete Changes to tablet software by November 1, 2014
- Responsible Party: Director, Asset Management



IPL ACTION PLAN | #7

- **Update Staffing Plans**
 - **Ensure no critical loss of institutional knowledge**
 - Continue to monitor, update, and implement the Company's succession plan for key staff responsible for network operations and emergency response
 - Includes control room staff, first responders, engineering support, and those responsible for public and customer communications
- **Complete by June 1st annually**
- **Responsible Party: Customer Operations Leadership**



IPL ACTION PLAN | #8

- **Staff Training**
 - Actively participate in industry forums and conferences where other companies that operate secondary network systems also participate
 - Example: 2015 Eaton Electrical Network Systems Conference
 - Annual funding for travel and memberships is included in O&M budget
- **Complete by June 1st annually**
- **Responsible Party: Customer Operations Leadership**



IPL ACTION PLAN | #9

- **Network Inspection Process Audit**
 - Implement process to verify inspection data from tablets is downloaded properly to on-line systems - **COMPLETE**
 - Implement periodic auditing of maintenance and inspection records for completeness
 - Conduct audit of back office process to improve and assure the retrieval and completeness of inspection and maintenance records in master database
- **Complete Process Audit and develop Action Plan to address any gaps identified by March 31, 2015**
- **Responsible Party: Director, Asset Management**



Responses to IURC Data Requests



IPL ENGAGES IN SUCCESSION PLANNING

- **Long-Term Succession Planning**
 - Downtown Network is supported by an organization of 72 people and IPL regularly reviews scheduled work activities to optimize this number
 - The downtown network has an integrated web of leadership that is not dependent on any one individual
 - IPL's Power Delivery Staffing Study analyzes specific workforce and future needs to help support the succession plan process
 - IPL leverages this information to identify and develop individuals for all positions



IPL IS COMMITTED TO MAINTAINING A SKILLED WORKFORCE

- **Multi-faceted approach to succession planning**
 - Hiring the right people
 - Job rotations
 - On-the-job training
 - External formal training and conferences
 - System and Technical enhancements
 - Coaching and mentoring of young professionals



IPL HAS STRENGTHENED THE RIGOR OF POWER DELIVERY ASSET MANAGEMENT

- **Asset Management Framework**
 - Maintenance/Inspection and capital investment
 - Asset replacement programs for downtown network
 - Systematic approach using performance indicators
- **Power Delivery Organization integrated with DP&L as part of the new Customer Operations Organization**
 - Ensures continued high reliability provided in an efficient and effective manner
 - Provides additional people resources and increased opportunities to share best practices and knowledge



IPL'S COMMITMENT

- **IPL's downtown network system is safe and reliable**
- **IPL is committed to taking the necessary actions to assure the continued safe and reliable operation of its downtown network**
- **IPL continues to take actions to reduce the likelihood and impact of any future occurrences within its downtown network system**



Questions



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Appendix



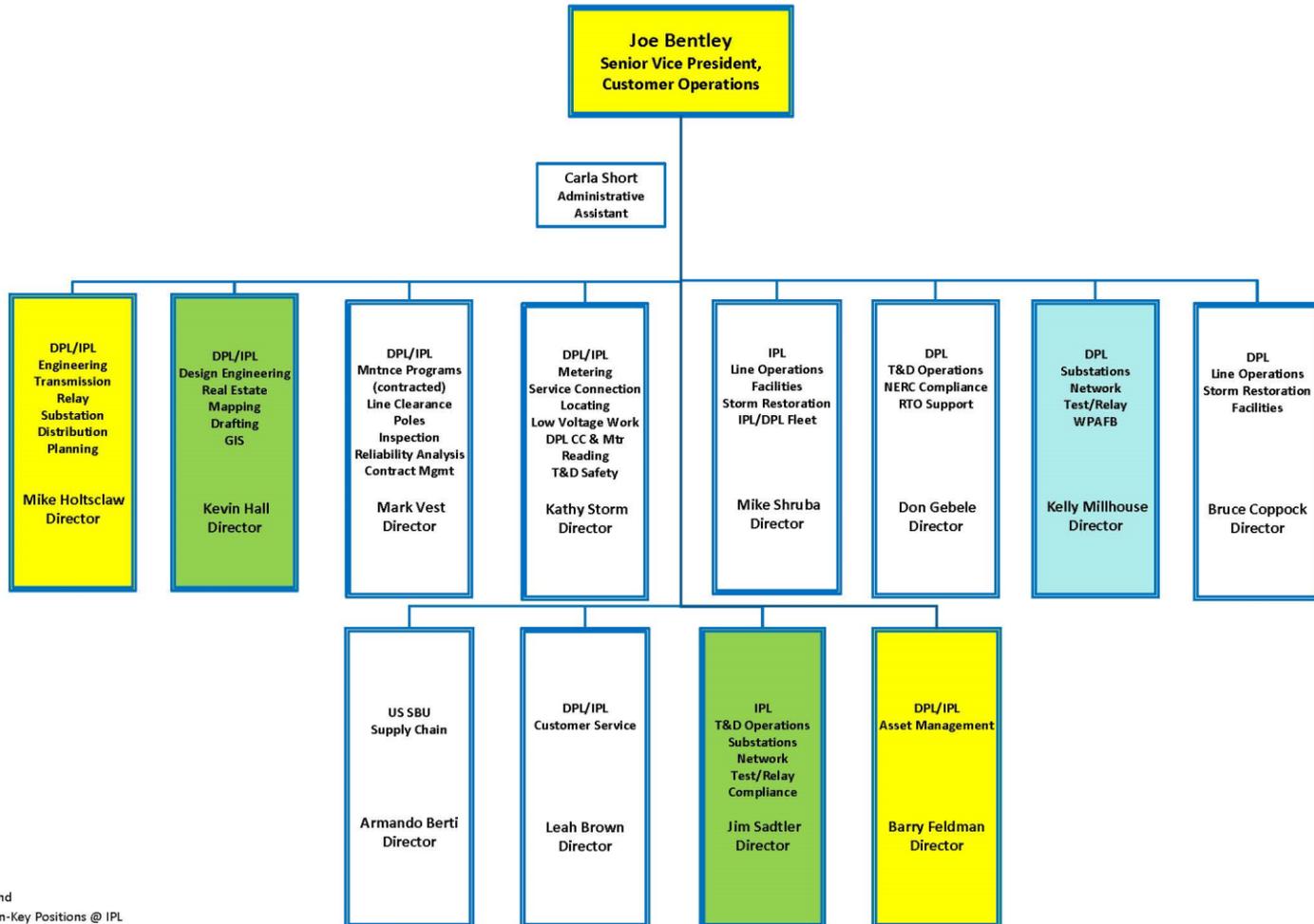
APPENDIX: POST EVENT UG 651 **NETWORK PROTECTOR**





APPENDIX: ORGANIZATIONAL CHARTS

Customer Operations Organization Attachment

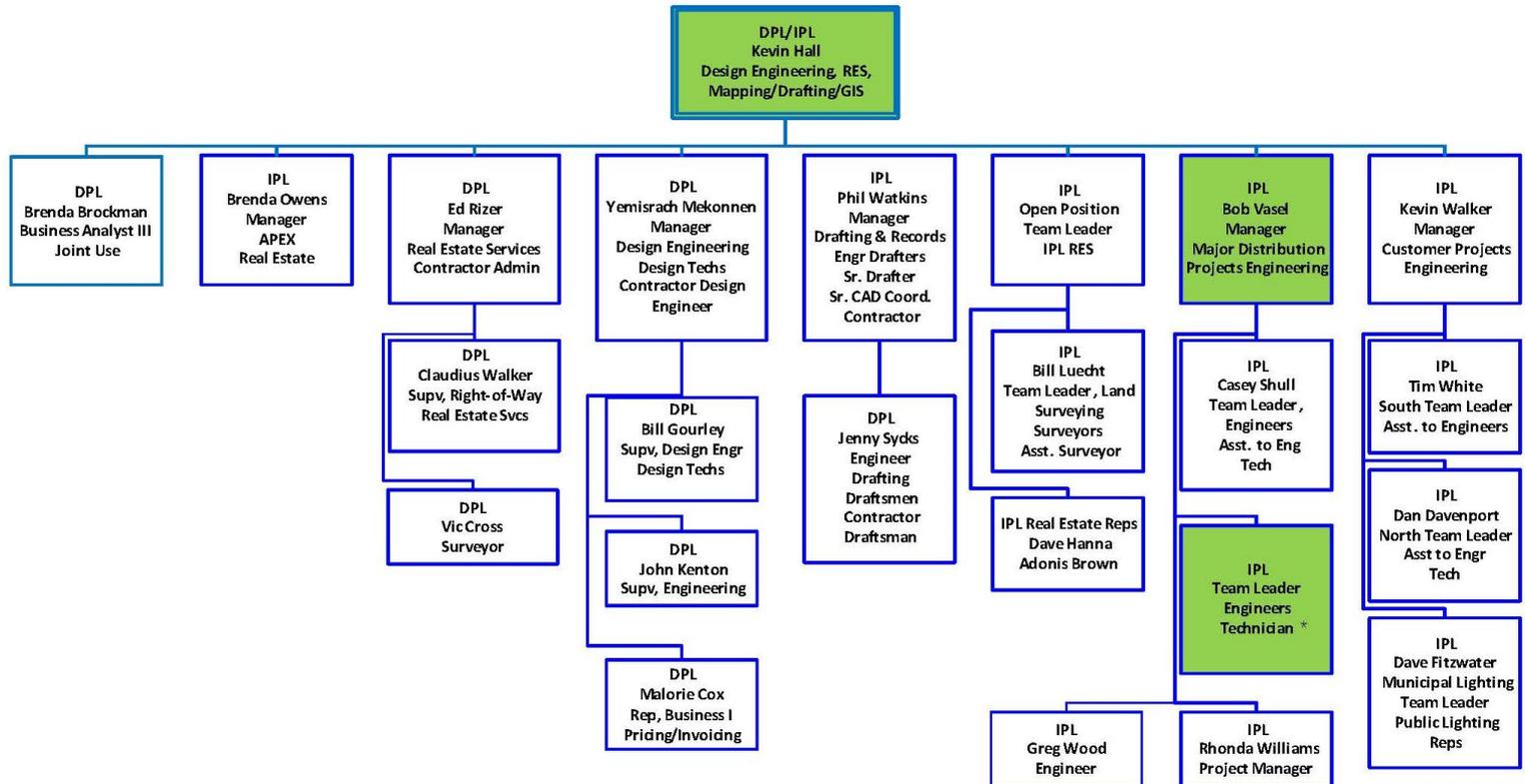


Legend
 Green-Key Positions @ IPL
 Yellow-Backup Positions @ IPL
 Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL



APPENDIX: ORGANIZATIONAL CHARTS

Design Engineering Group Attachment



Legend

Green-Key Positions @ IPL

Yellow-Backup Positions @ IPL

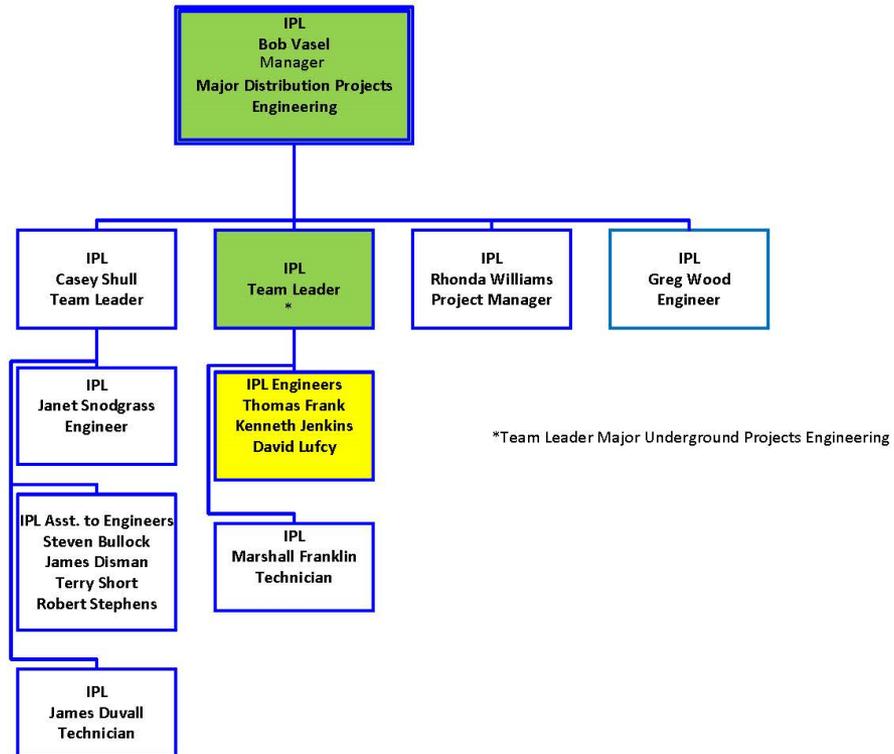
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*Team Leader Major Underground Projects Engineering



APPENDIX: ORGANIZATIONAL CHARTS

IPL Major Underground Projects Engineering Group Attachment



*Team Leader Major Underground Projects Engineering

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Green-Key Positions @ IPL

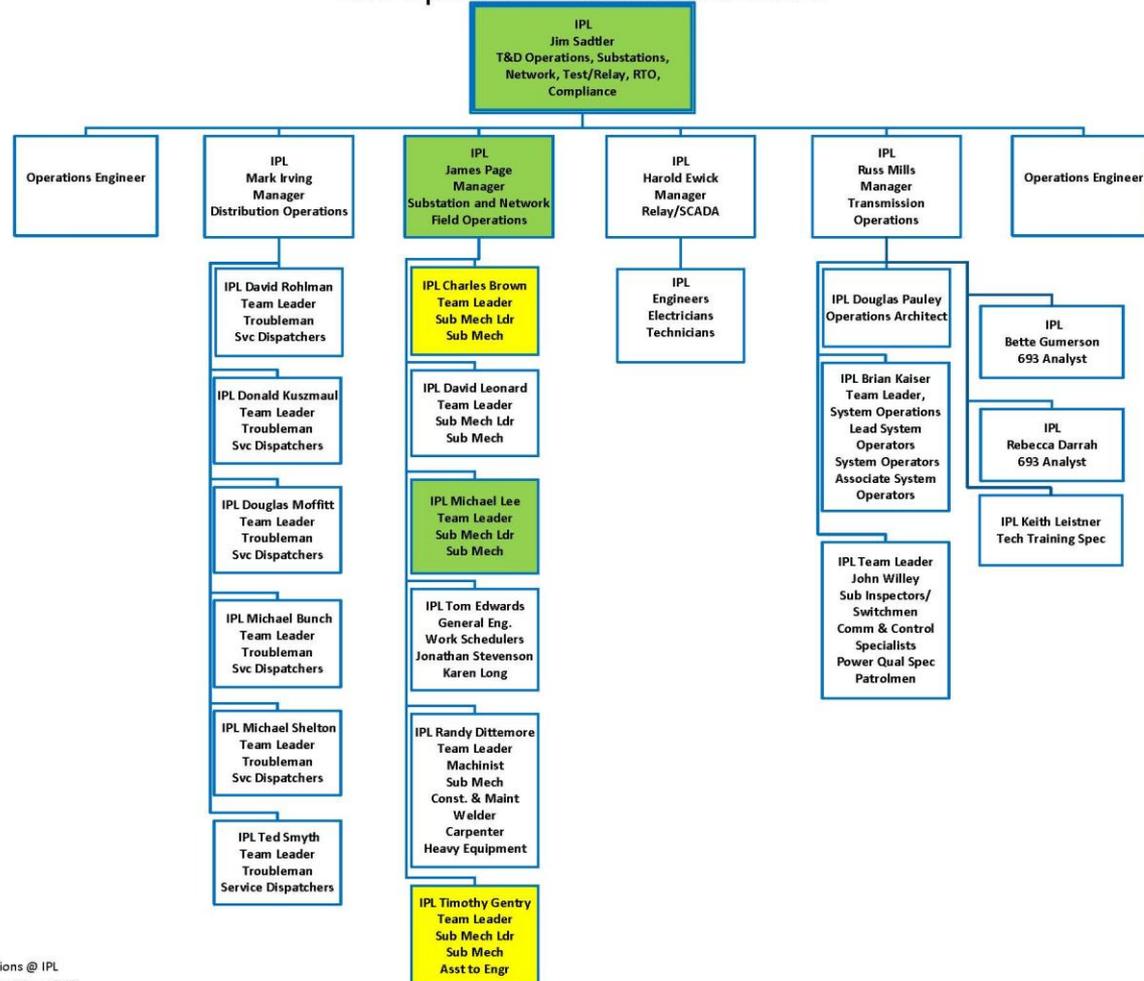
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APPENDIX: ORGANIZATIONAL CHARTS

T&D Operations Team Attachment

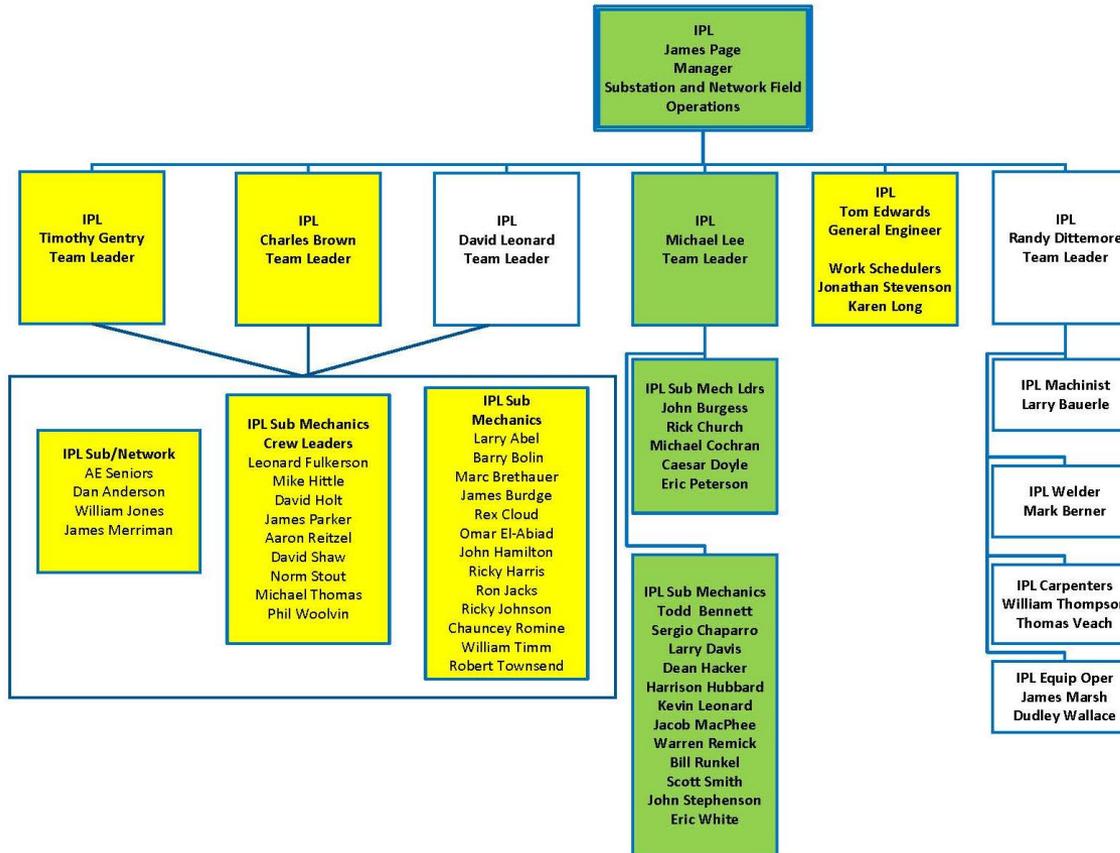


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APPENDIX: ORGANIZATIONAL CHARTS

IPL Substation and Network Field Operations Group Attachment

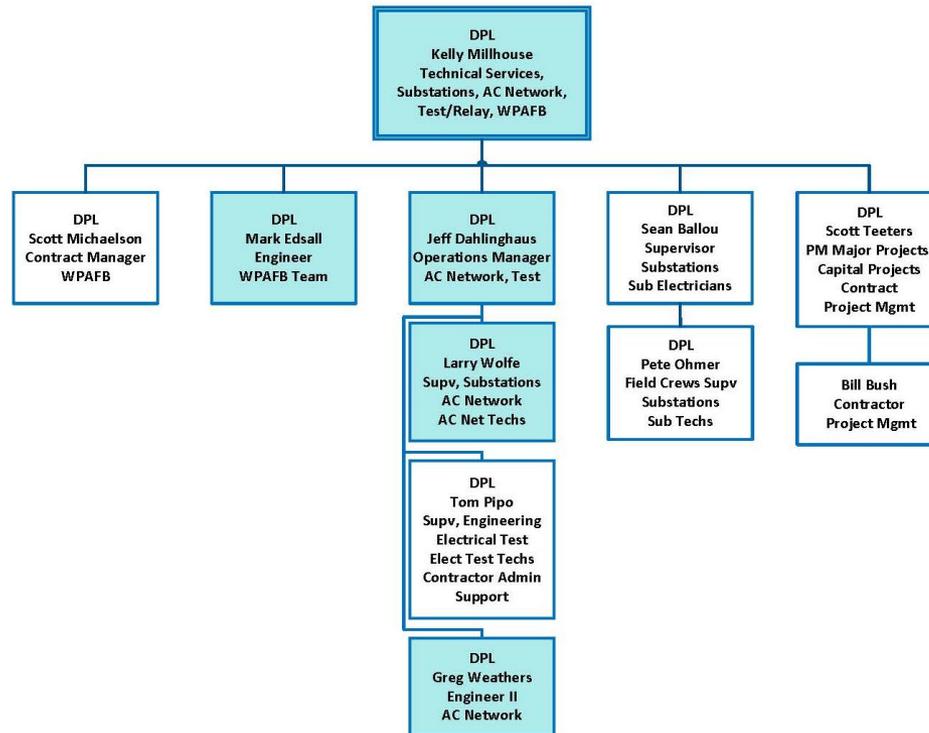


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APPENDIX: ORGANIZATIONAL CHARTS

DPL Substations & AC Network Team Attachment



Legend

Green-Key Positions @ IPL

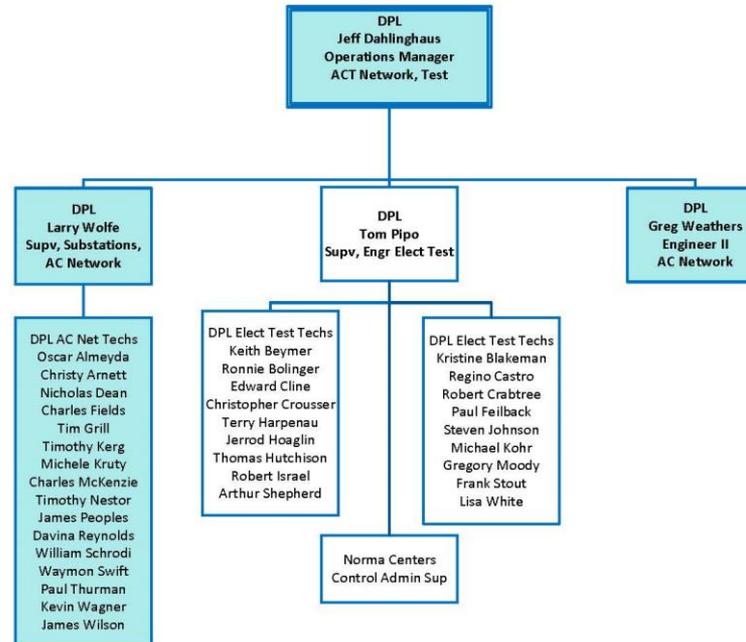
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APPENDIX: ORGANIZATIONAL CHARTS

DPL Substations and AC Network Team Attachment (Continued)



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